



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,371	08/05/2003	Taku Shimizu	035576/267857	6921

826 7590 09/21/2006

ALSTON & BIRD LLP  
BANK OF AMERICA PLAZA  
101 SOUTH TRYON STREET, SUITE 4000  
CHARLOTTE, NC 28280-4000

EXAMINER

HANDAL, KAITI V

ART UNIT PAPER NUMBER

1764

DATE MAILED: 09/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/634,371

Applicant(s)

SHIMIZU ET AL.

Examiner

Kaity Handal

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1).

With respect to claims 1 and 11, Ovshinsky teaches a hydrogen supply system (fig. 2), comprising: a hydrogen supply station/(hydrogen storage bed (51) and meter (43)); and a hydrogen production system (fig. 4, 32) (page 5, paragraph [0056] and [0057], lines 1-5); wherein the hydrogen supply system (fig. 2) supplies hydrogen produced by the hydrogen production system (32) to the hydrogen supply station/(hydrogen storage bed (51) and meter (43)).

Ovshinsky fails to teach wherein the hydrogen production system (32) has a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel. Iijima teaches a membrane reformer (fig. 2, 2) having a material tank/fuel tank (fig. 1, 1) and is capable of reforming fuel and separating hydrogen from reformed fuel in his hydrogen production apparatus (col. 3, lines 37-40) in order to keep the reaction temperature in fuel reforming low (col. 3, lines 30-36).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel in Ovshinsky's hydrogen supply system instead of having separate units for hydrogen production and for hydrogen purification, as taught by Iijima, in order to keep the reaction temperature in fuel reforming low.

Ovshinsky fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentably distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg*, 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

With respect to claims 2 and 3, Ovshinsky teaches wherein the hydrogen supply station is a hydrogen supply station/(hydrogen storage bed (51) and meter (43)) for a fuel cell powered automobile (page 1, paragraph [0002]).

With respect to claim 4, Iijima further teaches wherein the membrane reformer comprises a hydrogen separation membrane that is capable of generating hydrogen having a purity as high as 99.999% pure (col. 4, lines 7-14).

3. Claims 5-6 and 10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), as applied to claim 1 above, and further in view of Singh et al. (US 5,686,196).

With respect to claim 5, modified Ovshinsky discloses all claim limitations as set forth above including having a hydrogen production system (32) which employs reforming (page 5, paragraph [0056] and [0057], lines 1-5), but Ovshinsky does not show the specific components involved in reforming. Singh teaches a hydrogen production system comprising an evaporator (illustrated in figure) to provide water vapor in order to prevent carbon formation during the reformation process (col. 3, lines 36-40).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Ovshinsky's modified apparatus, as taught by Singh, in order to prevent carbon formation during the reformation process.

With respect to claim 6, Singh further teaches wherein the mobile hydrogen production system comprises a desulfurizer/hydrodesulfurizer (illustrated in figure).

With respect to claim 10, Singh further teaches wherein the mobile hydrogen production system is configured to produce hydrogen by being supplied with two or more kinds of material/(diesel fuel and evaporated water) (as illustrated in figure).

With respect to claim 12, Singh further teaches wherein the mobile hydrogen production system comprises a hydrogen tank/storage (as illustrated in figure).

With respect to claim 13, Ovshinsky further teaches wherein system comprises hydrogen supply stations at two or more locations, and wherein the mobile hydrogen production system moves to the hydrogen supply stations (fig. 4, 36).

With respect to claim 14, Singh further teaches wherein the mobile hydrogen production system comprises a driving/water pump mechanism using a fuel cell (as illustrated in figure), and a material tank/condenser for supplying material/water to be converted to hydrogen wherein the produced hydrogen is utilized for the running of the mobile hydrogen production system itself (as illustrated in the figure).

4. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), as applied to claim 1 above, and further in view of Okada et al (US 5,124,140).

With respect to claim 7, modified Ovshinsky discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a prereformer for decomposing: higher hydrocarbon into lower hydrocarbon. Okada teaches steam reforming of hydrocarbons wherein a prereformer is upstream a steam reformer (fig. 1) in order to decompose higher hydrocarbon (col. 2, lines 21-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a prereformer in the hydrogen production system of Ovshinsky as modified, as taught by Okada, in order to decompose higher hydrocarbon.

Regarding limitations recited in claim 8 which are directed to a manner of operating disclosed device, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do

Art Unit: 1764

not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115.

Further, process limitations do not have patentable weight in an apparatus claim.

See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), as applied to claim 1 above, and further in view of Iio (US 6,908,700 B2).

With respect to claim 9, modified Ovshinsky discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a compressor unit for compressing hydrogen. Iio teaches a fuel cell system comprising a reformer (fig. 4, 3), a compressor (17) and a hydrogen storage device (14) wherein said compressor compresses hydrogen in order to send it to the hydrogen storage device (14) (col. 4, lines 61-63).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a hydrogen compressor in the modified hydrogen production system of Ovshinsky, as taught by Iio, in order to compress hydrogen and send it to the hydrogen storage device.

Art Unit: 1764

6. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), as applied to claims 1 and 4 above, and further in view of Vidalin (US 2002/0085963 A1).

With respect to claims 15-17, Ovshinsky as modified discloses all claim limitations as set forth above but fails to show wherein the hydrogen production system comprises a CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base for regenerating used absorbent and recovering CO<sub>2</sub> and wherein the regenerated absorbent is utilized to absorb CO<sub>2</sub> in the hydrogen production system. Vidalin teaches a steam reforming system comprising a CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base in order to recover carbon dioxide (page 5, paragraph [0034]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base in the modified hydrogen production system of Ovshinsky, as taught by Vidalin, in order to recover carbon dioxide.

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), in view of Iio (US 6,908,700 B2), and Singh et al. (US 5,686,196), and Vidalin (US 2002/0085963 A1).

With respect to claim 18, Ovshinsky teaches a hydrogen production system (32) which employs reforming (page 5, paragraph [0056] and [0057], lines 1-5),



Ovshinsky further teaches wherein the hydrogen production system comprises reformer or and a hydrogen separation unit using a hydrogen separation membrane/filter (page 6, paragraph [0069]). Ovshinsky does not show the specific components involved in reforming. Iio further teaches a fuel cell reformer system comprising a reformer (fig. 4, 3), a compressor (17) and a hydrogen storage device (14) wherein said compressor compresses hydrogen in order to send it to the hydrogen storage device (14) (col. 4, lines 61-63).

Ovshinsky fails to teach wherein the hydrogen production system (32) has a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel. Iijima teaches a membrane reformer (fig. 2, 2) having a material tank/fuel tank (fig. 1,1) and is capable of reforming fuel and separating hydrogen from reformed fuel in his hydrogen production apparatus (col. 3, lines 37-40) in order to keep the reaction temperature in fuel reforming low (col. 3, lines 30-36).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a membrane reformer capable of reforming fuel and separating hydrogen from reformed fuel in Ovshinsky's hydrogen supply system instead of having separate units for hydrogen production and for hydrogen purification, as taught by Iijima, in order to keep the reaction temperature in fuel reforming low.

Ovshinsky fails to show the specific components involved in reforming such as having an evaporator. Singh teaches a hydrogen production system comprising an

Art Unit: 1764

boiler/evaporator (illustrated in figure) to provide water vapor in order to prevent carbon formation during the reformation process (col. 3, lines 36-40).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Ovshinsky's apparatus, as taught by Singh, in order to prevent carbon formation during the reformation process.

Singh further teaches wherein the hydrogen production system comprises a hydrogen tank/storage and a material tank/condenser (illustrated in figure).

Ovshinsky fails to show a steam reforming system comprising a CO<sub>2</sub> solvent tank. Vidalin teaches a steam reforming system comprising a CO<sub>2</sub> solvent tank/CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base in order to recover carbon dioxide (page 5, paragraph [0034]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base in the hydrogen production system of Ovshinsky, as taught by Vidalin, in order to recover carbon dioxide.

Ovshinsky fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg*, 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

Art Unit: 1764

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (US 2002/0029820 A1) in view of Iijima et al. (US 6,649,291 B1), as applied to claim 1 above, and further in view of Iio (US 6,908,700 B2), and Singh et al. (US 5,686,196), and Vidalin (US 2002/0085963 A1).

With respect to claim 19, Ovshinsky as modified teaches a hydrogen production system (32) which employs reforming (page 5, paragraph [0056] and [0057], lines 1-5), Ovshinsky as modified further teaches wherein the hydrogen production system comprises membrane reformer. Ovshinsky as modified does not show the specific components involved in reforming. Iio further teaches a fuel cell reformer system comprising a reformer (fig. 4, 3), a compressor (17) and a hydrogen storage device (14) wherein said compressor compresses hydrogen in order to send it to the hydrogen storage device (14) (col. 4, lines 61-63).

Ovshinsky as modified fails to show the specific components involved in reforming such as having an evaporator. Singh teaches a hydrogen production system comprising an boiler/evaporator (illustrated in figure) to provide water vapor in order to prevent carbon formation during the reformation process (col. 3, lines 36-40).

It would have been obvious to one having an ordinary skill in the art at the time the invention was made to include a reformer having an evaporator in Ovshinsky's modified apparatus, as taught by Singh, in order to prevent carbon formation during the reformation process.

Art Unit: 1764

Singh further teaches wherein the hydrogen production system comprises a hydrogen tank/storage and a material tank/condenser (illustrated in figure).

Ovshinsky as modified fails to show a steam reforming system comprising a CO<sub>2</sub> solvent tank. Vidalin teaches a steam reforming system comprising a CO<sub>2</sub> solvent tank/CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base in order to recover carbon dioxide (page 5, paragraph [0034]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a CO<sub>2</sub> recovery unit and an absorbent regeneration/stripper base in the modified hydrogen production system of Ovshinsky, as taught by Vidalin, in order to recover carbon dioxide.

Ovshinsky as modified fails to teach wherein the hydrogen production system is mobile. The fact that the hydrogen production system is mobile/portable or movable is not sufficient by itself to patentable distinguish over an otherwise old device unless there are new or unexpected results. *In re Lindberg*, 194 F.2d 732, 93 USPQ 23 (CCPA 1952). MPEP 2144.04 V A.

### ***Response to Arguments***

Applicant's arguments with respect to claims <sup>1-19</sup> have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment.

### ***Conclusion***

Art Unit: 1764

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1764

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH 

9/12/2006

  
ALEXA DOROSHENK NECKEL  
PRIMARY EXAMINER